

Claims

1. A modular building unit comprising a shell formed from side wall lattice frameworks connected together by cross-beams at floor and ceiling height and end wall lattice frameworks secured to the ends of the resulting structure, wherein
 - 5 each of the wall lattice frameworks comprises an array of mutually parallel spaced structural uprights made from cold-formed structural steel sections, secured together by horizontal or diagonal cross-braces also made from cold-formed structural steel sections,
 - 10 each of the cross-beams is made from a cold-formed structural steel C-section and is connected to the wall lattice frameworks by being sleeved into or around lateral spur members extending from the wall lattice frameworks prior to being welded thereto,
 - 15 the cross-braces of each wall lattice framework are centred on a plane that is displaced outwardly from the internal dimensions of the shell, and
 - 20 internal cladding on the interior of the shell comprises wall panels connected to the cross-braces by cold-formed steel resilient bars each of which has one longitudinal edge portion secured to the cross-braces and an opposite longitudinal edge portion secured to the wall panels to hold the wall panels out of contact with the structural uprights and to define an extended heat path from the wall panels to the structural uprights through the resilient bars and through a longitudinally extending portion of each cross-brace.
2. A modular building unit according to claim 1, wherein the structural uprights are of C-section and the spur members are T-shaped or L-shaped each comprising two limbs of which one sits inside the C-section of the associated structural upright and the other extends transversely therefrom as a spur to receive an end of an associated cross-beam.
3. A modular building unit according to claim 2, wherein each limb of the spur member is made of cold-formed structural steel and has a general C-section.

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4. A modular building unit according to any preceding claim, wherein each C-section includes one or more swages in the back, side or front faces of the section.

5. A modular building unit according to any preceding claim, wherein each C-section includes an inturned flange on one or both of the front elements of the section.

6. A modular building unit according to any preceding claim, wherein in each wall panel the cross-braces are welded to the outsides of the structural uprights.

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7. A modular building unit according to any of claims 1 to 5, wherein in each wall panel the cross-braces pass through slots formed in the structural uprights.

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8. A modular building unit according to claim 7, wherein the slots are created by stamping apertures in the steel stock from which the structural uprights are formed, prior to cold-forming the steel stock into the sectional profile of the structural uprights.

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9. A modular building unit according to claim 1, wherein the structural uprights, the cross-beams and the cross-braces are all formed from cold-rolled structural steel sections comprising a pair of arcuate or substantially arcuate opposite side portions each of which extends in a wholly or substantially smooth arc from a central slot opening onto the corresponding lateral side and from the corresponding lateral side onto an arcuate or substantially arcuate concave portion of a rear wall.

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10. A modular building unit according to claim 8, wherein the cross-braces are connected in the plane of the structural uprights and extend diagonally from one structural upright to the next.

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11. A modular building unit according to claim 8 or claim 9, wherein selected structural uprights and/or selected cross-beams are reinforced by including, within

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one or both of the arcuate or substantially arcuate opposite side portions, a reinforcing rod or tube.

12. A modular building unit according to claim 11, wherein the ends of the
5 reinforcing rods or tubes are provided with connecting means for connecting them to
the reinforcing rods or tubes of adjacent modules, to connect together the modules.

13. A modular building unit according to any preceding claim, wherein additional
floor panel thickness external panels are secured over the top of the shell.

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14. A modular building unit according to any preceding claim, wherein each of the
connections between the structural uprights and the horizontal cross-braces and each
of the connections between the spur members and the structural uprights and the
cross-beams incorporates at least one weld that is a spot weld, a seam weld or a plug
15 weld.

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15. A modular building unit according to any preceding claim, wherein door and
window final fittings, together with electrical and plumbing connections, are
incorporated into the modular building unit before that unit is assembled with others
20 as a building.

16. A method of fabricating a modular building unit according to any preceding
claim, comprising:

(a) creating a shell by:

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(i) fabricating the wall lattice frameworks each comprising:

an array of mutually parallel spaced structural uprights secured
together by horizontal or diagonal cross-braces, both the structural uprights and the
cross-braces being made from cold-formed structural steel sections, with the cross-
braces being centred on a plane that is displaced outwardly from the internal
30 dimensions of the shell, and

a row of floor level spur members and a row of ceiling level spur members extending laterally from the structural uprights of each wall lattice framework;

5 (ii) joining together the wall lattice frameworks to form the shell by sleeving the cross-beams of cold-formed structural steel C-section into or around the spur members and then welding the cross-beams to the spur members; and

(iii) securing the end wall lattice frameworks to opposite ends of the shell so formed; and

(b) lining the shell by securing the wall panels to the cross-braces by securing 10 one longitudinal edge portion of each of an array of cold-formed steel resilient bars to the cross-braces and an opposite longitudinal edge portion of each of the resilient bars to the wall panels to hold the wall panels out of contact with the structural uprights and to define an extended heat path from the wall panels to the structural uprights through the resilient bars and through a longitudinally extending portion of each 15 cross-brace.

17. A method according to claim 12, wherein the side and end wall lattice frameworks are made and assembled at a first manufacturing site; those assembled frameworks are transported to a second manufacturing site; the wall lattice 20 frameworks are assembled with the cross-beams to form the shell at the second manufacturing site; and the shell is lined and fitted-out at the second manufacturing site.